REMARKS

Applicant hereby requests further consideration of the application in view of the amendments above and the comments that follow.

I. Status of the Application

At the time of the Action, Claims 1-19 were pending. All pending claims stand rejected under Section 103(a). Also, the Action objects to the Abstract as being too lengthy; Applicants have submitted a revised Abstract above to address this objection.

The rejections under Section 103(a) are addressed below.

II. The Section 103(a) Rejections

The Action rejects Claims 1-11 and 14-19 as obvious under Section 103(a) based on U.S. Patent No. 5,607,797 to Hasegawa (Hasegawa) in view of Japanese Patent No. 10-144269 to Nakano (Nakano), and also rejects Claims 12 and 13 based on Hasegawa and Nakano and further in view of U.S. Patent No. 3,802,488 to Hull et al. (Hull). The Action states that:

> Hasegawa et al. teach a method of manufacturing a battery comprising providing a cell for a battery having alternate positive and negative electrode plates (2, 3), each of the positive and negative electrode plates being separated by an electrically insulative separator member (4),the positive and negative electrodeplates being an overlying relationship (fig. 1), and wherein each of the positive electrode plates includes a projecting tab extending from an adjacent upper portion thereof (5, fig. 1), the projecting tab to the positive place being generally aligned (fig. 1), and wherein each of the negative electrode plates includes a projecting tab (5, fig. 1), the projecting tabs of the negative plates being generally aligned (fig. 1); attaching a conducting connecting strap to the projecting tabs of the positive electrode plates (6), applying a Material (10) to the upper portions of the positive place, and allowing the cap material to hard to provide a cap attached to the upper portions of the positive plates (col. 4, lines 59-64). However, Hasegawa et al. failed to teach said cap material covering portions of the projecting tabs.

> Nakano teach a method of manufacturing a battery comprising alternating positive and negative electrode plates (P, N, fig. 8), each plate having a projecting tab being generally aligned with the same type of tab (p, n, fig. 4), attaching a conductive connecting strapped to the projecting tabs (PS, NS, fig. 6), and applying a cap material to portions of the projecting tabs (5, G), and allowing the cap material to harden to provide a Attached to the projecting tabs (paragraph 3). Nakano teach that it is advantageous to use the cap material to reinforce the area around the protecting tabs and connecting strap (paragraph 3 and paragraph 5). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the method of manufacturing a battery of Hasegawa et al. With the step of adding cap material to the projecting tabs because the common to teach improved reinforcement of the area around the projecting tabs and connecting strap.

The Action at pages 3-4. Based on these findings, the Action rejects independent Claims 1 and 14 under Section 103(a).

Batteries and methods according to embodiments of the present invention are directed to mitigating the problem of fracture at the joints between the tabs of the positive electrode plates and the positive connecting strap in a lead acid battery. As explained at page 3, lines 3 to 14 of the specification, that area of the positive electrode plate can become brittle due to oxidation that takes place on the surface of the tabs. That oxidation promotes cracking which may result in the tabs fracturing completely away from a plate.

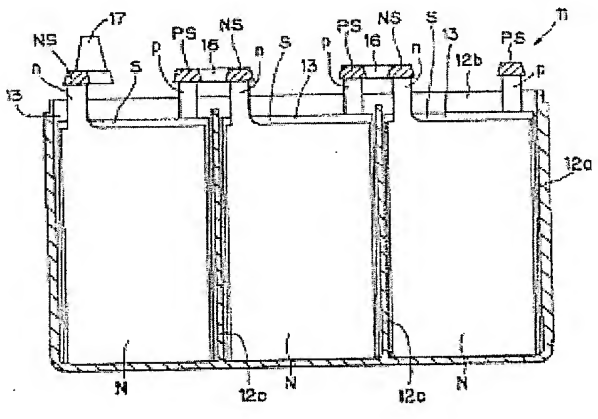
In mitigation of that problem, Claim 1 provides a process in which a cap material is applied to portions of the projecting tabs and the adjacent upper portions of the positive plates. Correspondingly, Claim 14 is directed to a battery comprising a cap which covers portions of the projecting tabs and the adjacent upper portions of the positive plates. The cap can inhibit corrosion and oxidation of the area of the positive plates around the junction between the tab and positive plate. As recited in claims 1 and 14, the cap material is present on the projecting tabs and the adjacent upper portions of the positive plates.

Hasegawa is directed to overcoming the problem of lead acid battery failure caused by vibration of a battery in use. Hasegawa does mention a problem of a decrease in mechanical strength of the strap for connecting the plate groups owing to corrosion caused by an increase

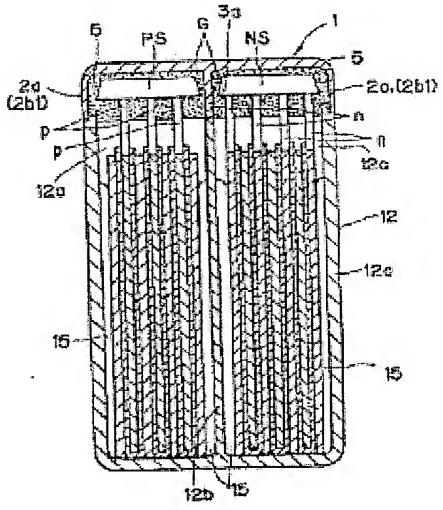
in temperature or decrease in the amount of electrolyte (see column 1, lines 14 to 20). However, Hasegawa is not concerned with reducing the degree of corrosion but is rather directed to the provision of beam members within the battery which increase the strength and resistance to vibration. Indeed, Hasegawa states that "*A principle object of the present invention is to solve the above problems and to provide lead acid storage batteries excellent in vibration resistance even under the condition of strong vibration.*" (See column 1, lines 64 to 67).

In view of the foregoing, Applicants agree with the statement in the Action that Hasegawa fails to disclose cap material applied to the projecting tabs and the upper portions of the positive plates. However, Applicants disagree that Nakano discloses such a structure. The Action identifies components p, n of Nagano as meeting the recitation of "projecting tabs," and adhesive 5 as meeting the recitation of "cap material." Figures 4 and 6 of Nakano are shown below.

【図4】



【図6】



As can be seen in Figure 6, the adhesive 5 is confined to the upper portions of the projections p, n from the positive and negative plates P, S and does not reach either the lower portions of

the projections p, n or the upper portions of the positive and negative plates P, N. In fact, there is a substantial gap between the lower level of the adhesive 5 and the upper edges of the positive plates P (note that the upper edges of the separators S, which extend farther upwardly than the upper edges of the positive and negative plates P, N, are positioned well below the lower surface of the adhesive 5 in Figure 6). As such, Applicants submit that at least this element of independent Claims 1 and 14 is absent from both Hasegawa and Nakano.

In fact, Nakano is directed principally to avoiding problems arising from the bending in of the outermost negative plate tabs, which is frequently done for reasons of limited space in the lid of a battery (see Figure 8). Nakano proposes a modified lid structure in which the central dividing barrier 3 that runs down the middle of the lid is narrow, thereby making available more space in the battery lid and rendering unnecessary the bending in of the outermost negative plate tabs (see Figure 6 above and paragraph [0004]). Accordingly, the Examiner's comment on page 4 of the Office Action that *"Nakano teach that it is advantageous to use the cap material to reinforce the area around the projecting tabs and connecting strap"* does not truly reflect the overall disclosure of Nakano; in fact, the skilled person would not see the teaching of Nakano as being relevant to the teaching of Hasegawa.

Also, in Nakano the adhesive G is used in a way which is completely incompatible with the teachings of Hasegawa. In Nakano the adhesive G is poured into pockets 5 in the upturned lid 1 and the individual stacks of electrodes are inverted and lowered down onto the lid so that the rows of projections (n, p) and their associated cast-on straps (PS NS) are immersed in the adhesive, which then cures to form a solid mass. The battery is then reoriented into its working orientation (see paragraph [0011] of Nakano). The process of Nakano is therefore incompatible with the process of Hasegawa because the lid of Hasegawa does not have sufficient depth to accommodate the tabs or cast-on straps (see the Figures of Hasegawa).

Moreover, in order to get the polyolefin resin material of Hasegawa to flow between the electrode plates, the electrode stack is orientated normally so that the polyolefin resin can be deposited on the upper edges of the electrode plates and will flow down between the plates under the influence of gravity. In fact, Hasegawa states explicitly that the molten resin flows

by gravity in the direction of the upright plates (the resin can flow only in this direction), see column 7, lines 45 to 49 of Hasegawa and see also column 6, lines 12 to 19 of Hasegawa. Accordingly, that polyolefin resin of Hasegawa could not be applied with the battery in the inverted position as taught by Nakano and therefore the skilled person would not modify and could not modify the teaching of Hasegawa in the light of Nakano, as suggested by the Examiner.

Finally, as discussed above, the cap can inhibit corrosion and oxidation of the area of the positive plates around the junction between the tab and positive plate. As recited in claims 1 and 14, the cap material is present on the projecting tabs and the adjacent upper portions of the positive plates. Both Hasegawa and Nakano fail to recognize that the use of cap material as recited in Claims 1 and 14 can provide these types of performance advantages.

In view of the foregoing, Applicants submit that it would not have been obvious to one of ordinary skill in this art to conceive the subject matter of the pending claims based on the cited art. Accordingly, Applicants respectfully request that the rejections under Section 103(a) be withdrawn.

III. Conclusion

In view of the foregoing, Applicants submit that the present application is in condition for allowance and the same is earnestly solicited. Should the Examiner have any small matters outstanding of resolution, he is encouraged to telephone the undersigned at 919-854-1400 for expeditious handling.

Respectfully submitted,

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